



PROPOSED PLAN/ DRAFT REMEDIAL ACTION PLAN FOR INSTALLATION RESTORATION SITES 1 AND 2 AT NAVAL STATION LONG BEACH, LONG BEACH, CALIFORNIA



FINAL

June 4, 1999

INTRODUCTION

The Department of the Navy (DON)* presents to the public this *Proposed Plan/Draft Remedial Action Plan (Draft RAP)*** to remediate the groundwater at Installation Restoration (IR) Sites 1 and 2 located at Naval Station (NAVSTA) Long Beach. The contaminants found are presented, and three alternatives to remediate the groundwater at IR Sites 1 and 2 are evaluated. The three alternatives are: (1) *no further action (NFA)*; (2) *institutional controls* in the form of deed restrictions and long-term groundwater monitoring; and (3) *in situ air sparging (IAS)* with *soil vapor extraction (SVE)*, deed restrictions, and long-term groundwater monitoring. Alternatives 2 and 3 also include the removal of buried cans, drums, other debris, and soil clinging to the debris. A preferred remedial alternative, including the rationale for its selection, is also discussed.

The DON is issuing this Proposed Plan/Draft RAP as part of its public participation responsibilities consistent with the *California Health and Safety Code*; section 117(a) of the *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*; and the *National Oil and Hazardous Substances Pollution Contingency Plan (NCP)*. This document summarizes information that can be found in greater detail in the *Remedial Investigation (RI)* report, which includes the *Human Health Risk Assessment (HHRA)*, and the *Feasibility Study (FS)* report. A quantitative HHRA was conducted as part of the RI to determine the need for action at IR Sites 1 and 2. The RI/FS reports are contained in the *administrative record* for the sites. The administrative record, which contains the information upon which the selection of the response action will be based, is available at the *information repository* located at:

Long Beach Public Library
Government Publications Department
101 Pacific Ave.
Long Beach, CA 90822
(562) 570-7500

The public is encouraged to review and comment on the Proposed Plan/Draft RAP and the RI/FS reports. The public comment period is June 10, 1999 through July 9, 1999. A public meeting will also be held on June 28, 1999 so that the public can discuss this Proposed Plan/Draft RAP with representatives from the Navy and state and federal environmental regulatory agencies.

The DON, with regulatory oversight, is the lead Federal agency for response actions under CERCLA. The CERCLA process is being used by the DON for site investigation and for evaluation and selection of remedial alternatives for the sites. CERCLA requires that all contaminated Federal facilities that are not on the *National Priorities List (NPL)*, such as NAVSTA Long Beach, comply with all applicable state laws concerning *removal and remedial actions*.

The DON is working in cooperation with the California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC), the Los Angeles Regional Water Quality Control Board (RWQCB), and the U.S. Environmental Protection Agency (U.S. EPA) in the selection of the final remedial actions. The final remedies for IR Sites 1 and 2 will be selected after the public comment period has ended and the information submitted during that time has been reviewed and considered. The preferred remedial alternatives presented in this Proposed Plan/Draft RAP may be modified based on comments received during the public comment period. All public comments received during the comment period will be responded to in a *Responsiveness Summary*, which will be included as part of the *Record of Decision (ROD)/Final Remedial Action Plan (Final RAP)*. The ROD/Final RAP will officially state the specific remedial actions that will be implemented for IR Sites 1 and 2.

PREFERRED ALTERNATIVE

The preferred alternative for IR Sites 1 and 2 addressed in this Proposed Plan/Draft RAP is based on an evaluation of results from sampling and testing soil and groundwater at the sites. The information from IR Sites 1 and 2 shows that most of the soil and groundwater does not pose a threat to the environment or to human health under an *industrial exposure scenario*. However, the contaminated groundwater at the eastern end of the mole (*Areas of Potential Concern [AOPCs]* 1 and 4) may pose a threat to the *marine ecosystem*.

IAS with SVE is proposed to treat the contaminated groundwater at the eastern end of the mole. Excavation is proposed to remove and dispose of cans, drums, other debris, and soil clinging to the debris from the area overlying the contaminated groundwater.

Institutional controls in the form of deed restrictions and long-term groundwater monitoring are proposed for IR Sites 1 and 2. Deed restrictions are proposed to maintain industrial land use. Long-term groundwater monitoring is proposed to verify groundwater quality and movement.

*Please see acronym list on page 11.

**Please see definitions of *italicized* words in the glossary on pages 9 and 10.

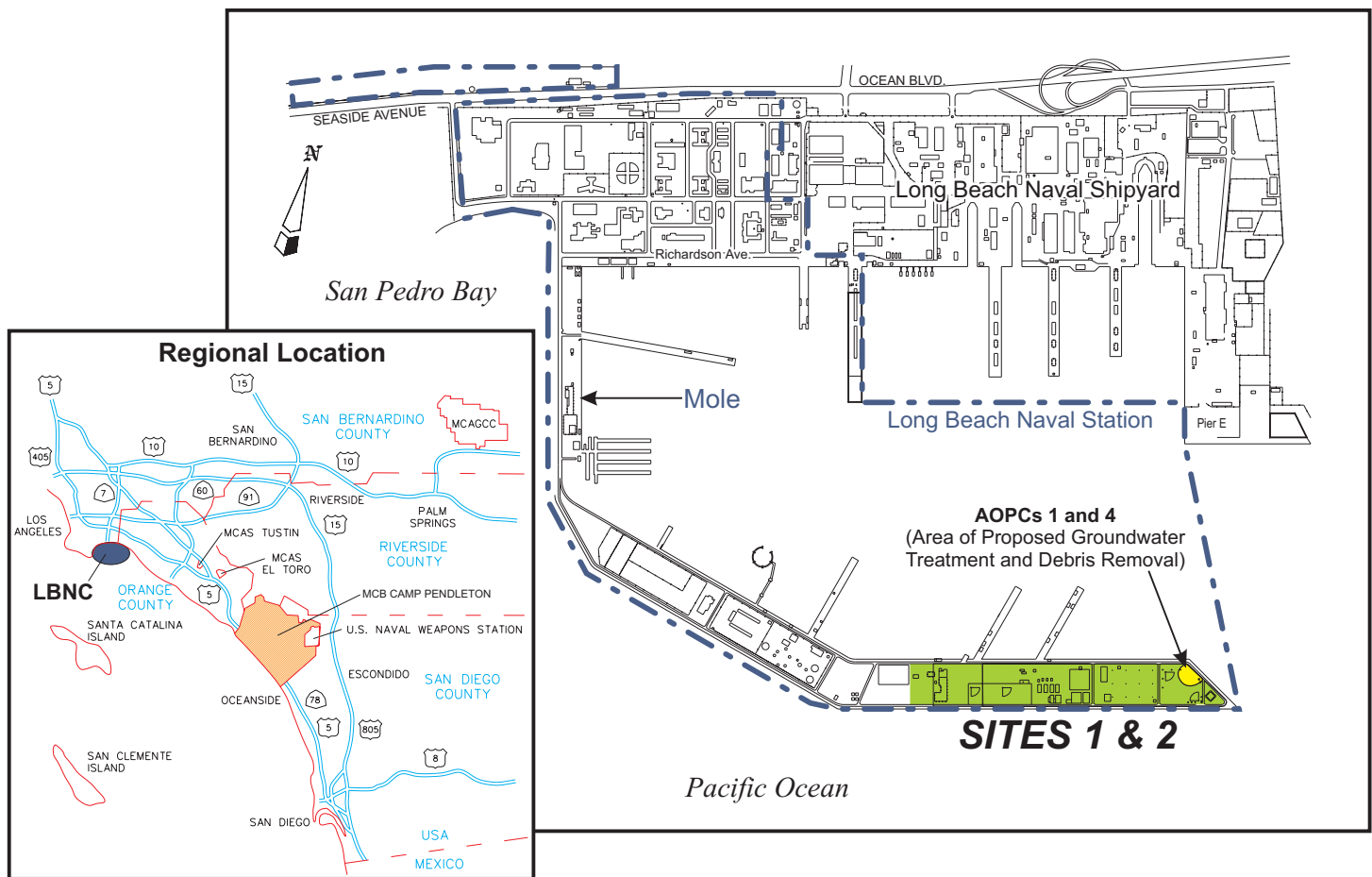


Figure 1. Long Beach Naval Complex

SITE LOCATIONS

IR Sites 1 and 2 are located at NAVSTA Long Beach, Los Angeles County, California. Both sites are located in the western portion of the Long Beach Naval Complex (LBNC) on a mole extending into Long Beach harbor. IR Site 1 is located totally within the boundaries of IR Site 2. Figure 1 is a map of the LBNC and shows the locations of IR Sites 1 and 2.

GENERAL ELEMENTS

Several elements of this Proposed Plan/Draft RAP are of a general nature. These elements include approaches, methods, and assumptions that were followed for IR Sites 1 and 2, as detailed below.

Assessment of Site Risks

As part of the RI, a quantitative HHRA was conducted on the groundwater and soil sampled from the IR sites to determine the need for action. A HHRA is a scientific evaluation that uses facts and assumptions to estimate the potential adverse effects on human health from exposure to chemicals. The HHRA examines two measures of risk: cancer risk and non-cancer risk. Conservative assumptions are used in the HHRA to ensure that the calculated risk is protective of public health.

Cancer risk is expressed in terms of the chance of contracting

cancer over a human's lifetime due to exposure to site chemicals, and is called the *excess lifetime cancer risk (ELCR)*. A risk of 1 out of 1 million means that one additional person out of a group of 1 million people may develop cancer as a result of exposure to a chemical. U.S. EPA considers a risk of less than 1×10^{-6} (1 in a million) to be protective of human health, and uses this value as the point of departure. Where the risk is less than 1×10^{-6} (the point of departure), the site or medium under consideration is unconditionally acceptable. No remediation, monitoring, or site use restrictions are applied. U.S. EPA also has developed a risk management range represented as 10^{-6} (1 in a million) to 10^{-4} (1 in 10,000) as the target for managing cancer risks at sites where industrial exposure scenarios are applied.

The NCP permits other-than-residential land use assumptions to be considered when performing risk assessments and developing remediation alternatives. The *Reuse Plan* for the LBNC, which was developed by the Local Redevelopment Authority (LRA) of the City of Long Beach, anticipates the future use of IR Sites 1 and 2 as industrial. In the future, IR Sites 1 and 2 will be used primarily for merchant marine support, parking, and warehousing.

Per the Reuse Plan of the LRA, the HHRA for Sites 1 and 2 assumes an industrial exposure scenario. An industrial exposure scenario encompasses both industrial workers and utility maintenance workers. An industrial worker is a person who works at a site 8 hours per day, 5 days a week, 250 days

per year for 25 years. An underground utility maintenance worker is a person who repairs buried utility lines at a site 8 hours per day, 10 days per year for 25 years.

Non-cancer health effects are evaluated in terms of a *hazard index* (the ratio of the actual or potential level of exposure to an acceptable level). U.S. EPA uses a hazard index value of less than 1 to represent acceptable non-cancer health effects. Non-cancer hazards above 1 indicate a potential for adverse effects.

Collection and Analysis of Site Data

During the RI, surface and subsurface soil samples and groundwater samples were collected and analyzed for the presence of chemicals. Samples were analyzed for both *organic compounds*, such as the chemical components of solvents or oils, and inorganic chemicals, such as metals. The analyses were then evaluated, using a rigorous validation process established by the U.S. EPA, to qualify the chemicals detected and to make sure that *data quality objectives* were met. Chemicals that were confirmed as detected in a particular area of the IR sites were identified as *chemicals of potential concern (COPCs)* from an AOPC. Five AOPCs were identified within IR Sites 1 and 2.

Identified COPCs were then compared to risk-based *regulatory threshold levels* and evaluated in a quantitative HHRA to determine whether they were *chemicals of concern (COCs)*. COCs are those chemicals that exceed regulatory levels or that are identified in the HHRA as posing a human health risk within the scenarios being evaluated. An AOPC becomes an *area of concern (AOC)* if COCs are present. All COPCs from IR Sites 1 and 2 were included in the HHRA for the sites. Based on the results of the RI and the HHRA, there are no COCs or AOCs associated with IR Sites 1 and 2.

Evaluation and Incorporation of New Data

The Cal-EPA DTSC; the Cal-EPA RWQCB, Los Angeles Region; and the U.S. EPA provided comments on the RI report. During comment-resolution, additional studies needed to complete the RI were identified for IR Sites 1 and 2. These additional studies are called the Supplemental Field Activities (SFA) of the RI. The results of the SFA are incorporated as Appendix U of the RI Report. All comments were also resolved and incorporated into the RI Report.

During the RI and the SFA, groundwater at all five AOPCs within IR Sites 1 and 2 was sampled and analyzed. Contamination was detected only at AOPCs 1 and 4. Because no contamination of groundwater was found at AOPCs 2, 3, and 5, they are not considered further for groundwater remediation at IR Sites 1 and 2. Institutional controls, in the form of deed restrictions, are proposed for AOPCs 2, 3, and 5 as part of remedial alternatives 2 and 3.

Chlorinated and nonchlorinated organic compounds were found in the groundwater beneath Gull Park, located in the north-northeast portion of IR Sites 1 and 2 (AOPCs 1 and 4) at the eastern end of the mole. It was determined that this *plume* could potentially affect nearby ocean waters. The analytical data indicated the presence of organic compounds in groundwater at concentrations in excess of *California Ocean Plan criteria*. Specifically, 1,1-dichloroethene (DCE),

benzene, trichloroethene (TCE), and vinyl chloride (VC) were found in groundwater at concentrations in excess of the California Ocean Plan criteria. Therefore, due to the location of the plume and the concentrations of organic compounds, the groundwater beneath AOPCs 1 and 4 at IR Sites 1 and 2 was recommended for further action.

The SFA, completed after the HHRA, confirmed the presence of organic compounds in soils at AOPCs 1 and 4. The results of these additional studies were compared in the RI to screening criteria developed by the U.S. EPA for industrial sites. Vinyl chloride was present in soils, but at a concentration less than the 10^{-4} risk-based screening criterion.

Recent activities at IR Sites 1 and 2 [AOPC 4] have included excavation and removal of petroleum-contaminated soils, which are not regulated under CERCLA. During excavation, cans and drums were uncovered in the general area where groundwater contamination was observed. Further excavation was then halted. The contents of one of these cans was characterized and disposed as hazardous waste. Removal of the remaining cans and drums will be a part of Remedial Alternatives 2 and 3. Soil clinging to drums and other debris will also be removed as part of Remedial Alternatives 2 and 3.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives were established to allow identification and screening of alternatives for groundwater remediation that achieve protection of human health and the environment consistent with reasonably anticipated land use. Under the NCP, future land use assumptions are developed and considered when developing remedial action alternatives and selecting a remedy. The NCP permits other-than-residential land use assumptions to be considered. The Reuse Plan for the LBNC includes industrial exposure scenarios. It was developed by the LRA, which includes members from the community.

The determination of remedial action objectives includes consideration of site-specific risks and *applicable or relevant and appropriate requirements (ARARs)*. Remedial action objectives were developed based on industrial land use, which is consistent with the NCP and the Reuse Plan for LBNC. There are no potable groundwater resources at NAVSTA Long Beach due to the high levels of dissolved minerals in the water. Industrial land use for parking, warehousing, and merchant marine support is the anticipated future use for IR Sites 1 and 2. Based on CERCLA, the NCP, the HHRA in the RI, and ARARs, the remedial action objectives for IR Sites 1 and 2 are:

Groundwater

- Minimize the potential for the migration of groundwater contaminants at concentrations that exceed California Ocean Plan criteria.
- Maintain industrial and utility maintenance worker exposure scenarios defined in the RI, to prevent human exposure to groundwater containing carcinogens that result in an ELCR greater than 1×10^{-4} .

- Maintain industrial and utility maintenance worker exposure scenarios defined in the RI to prevent human exposure to groundwater containing chemical concentrations that result in a hazard index greater than 1.

Surface and Subsurface Soil

- Locate and remove drums, other waste containers, and soil clinging to the containers in the north-northeast portion of IR Sites 1 and 2, AOPCs 1 and 4.
- Maintain industrial and utility maintenance worker exposure scenarios defined in the RI to prevent human exposure to soil containing carcinogens that result in an ELCR greater than 1×10^{-4} .
- Maintain industrial and utility maintenance worker exposure scenarios defined in the RI to prevent human exposure to soil containing chemical concentrations that result in a hazard index greater than 1.

IR SITES 1 AND 2: MOLE SOLID WASTE OPERATIONS AND CHEMICAL MATERIAL AND WASTE STORAGE AREAS

IR Site 1 is located totally within the boundaries of IR Site 2, which covers approximately 35 acres on the mole. This area is developed with buildings, recreation areas, and piers for waterfront fleet support. From the mid-1940s until the mid-1960s, some of the area was used as a landfill for disposal of solid wastes, including empty wooden and cardboard boxes, construction and demolition debris, rags, and other shipyard trash. Some wood, cardboard, construction and demolition debris, and other trash was burned prior to disposal. From the mid-1960s until 1980, wastes and drums of chemicals, including waste oils, acids, and paints, were stored on wood pallets in the area. Since 1980, IR Sites 1 and 2 have been used primarily for waterfront fleet support and parking. They also contain many buildings and recreational areas, including ball fields and a park.

Summary of Site Risks

The HHRA, which was conducted as part of the RI, concluded that no COCs are present in soils or in groundwater at IR Sites 1 and 2. The overall site human health risk, based on an industrial scenario, fell within U.S. EPA's target range of 1×10^{-4} to 1×10^{-6} . The hazard index is below U.S. EPA's acceptable criterion of 1.

The SFA, completed after the HHRA, confirmed the presence of organic compounds in soils and groundwater. The results of the additional studies were compared in the RI to screening criteria developed by U.S. EPA for industrial sites. Vinyl chloride was present in soils, but at a concentration less than the 1×10^{-4} risk-based screening criterion developed by the U.S. EPA for industrial sites. Based on a comparison of analytical results for groundwater to California Ocean Plan criteria, four organic compounds (DCE, benzene, TCE, and VC) are present in groundwater at concentrations greater than their respective

criteria.

Recent activities at IR Sites 1 and 2 (AOPC 4) included excavation and removal of petroleum-contaminated soils, which are not regulated under CERCLA. During excavation, cans and drums were uncovered in the general area where groundwater contamination was observed. Further excavation was then halted. The contents of one of these cans was characterized and disposed as hazardous waste.

As a result of the additional field investigation and the discovery of the buried debris, the DON has determined that:

- Groundwater in this area should be remediated to eliminate the threat of movement of contaminated groundwater to the ocean.
- The newly discovered cans, drums, other debris, and soil clinging to the containers and debris should be removed from the site and properly disposed.

SUMMARY OF ALTERNATIVES

Three potential alternatives were evaluated for meeting the remedial action objectives for IR Sites 1 and 2. Alternative 3, IAS with SVE, institutional controls in the form of deed restrictions, and long-term groundwater monitoring, is the preferred alternative.

Remedial alternatives, evaluated in the detailed analysis presented in the FS, were developed to preserve the reasonably anticipated land use and monitor the site for changes in groundwater flow and contaminant transport. In addition, the remedial alternatives were developed to remove debris and remediate contaminated groundwater that could migrate to the marine ecosystem. The screening evaluation did not include excavation of soils at IR Sites 1 and 2 because the DON had already determined to do so. However, one of the remedial action objectives includes the removal of buried cans, drums, other debris, and soil clinging to the containers and debris from IR Sites 1 and 2, AOPCs 1 and 4. The DON and the involved regulatory agencies have agreed to the removal of this debris. Therefore, the soil and debris removal will be performed in conjunction with Remedial Alternatives 2 and 3 discussed below. The cost for removing the debris is estimated at \$1,209,000. This cost will be in addition to the total costs for each alternative.

Capital costs and annual *operation and maintenance (O&M)* costs were estimated based on assumptions in the FS. All costs and implementation times for each alternative are estimated. Total costs are given in today's dollars (not adjusted for inflation) and represent net *present worth value*, as required by the Proposed Plan/Draft RAP guidance.

Alternative 1: No Further Action

Capital Cost:	\$0
Annual O&M Cost:	\$0
Months to Implement:	None

The NFA alternative implies that no activities will be implemented to remediate groundwater contaminants at the

site. The NCP requires that the NFA alternative be evaluated for every site to establish a baseline against which to compare and evaluate other alternatives.

Alternative 2 – Institutional Controls (Deed Restrictions) and Long-Term Groundwater Monitoring

Deed Restrictions

Capital Cost:	\$6,000
Annual O&M Cost:	\$0
Months to Implement:	3
Total Cost:	\$6,000

Institutional controls are non-engineering mechanisms and legal measures designed to limit access or land-use activities, such as subsurface borings, well drilling, or excavations, at a particular property. They may be used as part of an environmental remedy to limit exposure pathways to humans or to the environment from contamination that may be present at a site, or to protect a remedy that is in place. Deed restrictions are a type of institutional control. The following deed restrictions are proposed for IR Sites 1 and 2:

- Residential use shall be prohibited.
- Site operations shall be restricted to industrial/commercial uses consistent with the California Coastal Act and the Certified Port Master Plan for Los Angeles and Long Beach Harbor Districts.
- Industrial use shall not include child-care centers, playgrounds, or other areas frequented by children.
- Removal and disposal of contaminated soil or groundwater shall be conducted in accordance with all applicable Federal, state, and local regulations governing removal, transport, and disposal.
- Construction and/or operations on the property shall not interfere with ongoing monitoring or assessment work being conducted by or for Federal, state, or local regulatory agencies, unless specifically approved by the appropriate lead agency.

Long-Term Groundwater Monitoring

Capital Cost:	\$18,000
Annual O&M Cost:	\$74,000
Months to Implement:	12
Total Cost:	\$92,000

Long-term groundwater monitoring is an effective tool for evaluating whether remedial action objectives are being met. It is useful in monitoring COPC concentrations and plume movements.

A groundwater monitoring network consisting of seven monitoring wells for IR Sites 1 and 2 is already in place. The capital cost estimate assumes the installation of three additional wells, resulting in \$18,000 for capital costs. Groundwater monitoring for IR Sites 1 and 2 is expected to continue for at least one more year. At the end of that period, the stability of the plume will be evaluated and a determination made as to whether the monitoring program should be extended. The 12 "months to implement" is based

on the 1-year monitoring period. The per annum estimate of the cost of groundwater monitoring is made for costing purposes only.

Alternative 3 – In Situ Air Sparging with Soil Vapor Extraction and Institutional Controls (Deed Restrictions) and Long-Term Groundwater Monitoring

Capital Cost:

Air Sparging	\$360,000
Long-Term Groundwater Monitoring	\$18,000
Institutional Controls	\$6,000

Annual O&M Cost:

Year 1	\$194,000
Year 2	\$194,000
Year 3	\$74,000

Years to Implement:

3

Total Cost:

\$846,000

Air sparging is the process of injecting clean air directly into an aquifer for remediation of contaminated groundwater. The objective of air sparging is to force air through contaminated aquifer materials, to strip contaminants out of the aquifer, and to provide oxygen for bioremediation.

Bioremediation refers to enhancing the growth of naturally-occurring microorganisms that use contaminants such as petroleum products as a food source. In so doing, contaminated areas can be remediated naturally, with contaminants detoxified.

IAS can be coupled with SVE to capture and treat contaminant vapors that are carried into the *vadose zone*. Application of SVE avoids volatile emissions to the atmosphere by directing sparged contaminants to the SVE wells where the captured air can be treated above ground.

EVALUATION OF ALTERNATIVES AND SELECTION OF THE PREFERRED ALTERNATIVES

The nine evaluation criteria developed by the U.S. EPA for evaluation of remedial action alternatives are as follows:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume of Contaminants
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

Each alternative has undergone detailed evaluation and analysis using these evaluation criteria. The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The primary balancing criteria are used

to weigh major tradeoffs among alternatives. The modifying criteria are generally taken into account after the public comment period has ended and all comments have been reviewed and considered by the Navy to determine if the preferred alternative remains the most appropriate remedial action. The nine criteria are defined below and are accompanied by the evaluation of the three alternatives in terms of the criteria.

THRESHOLD CRITERIA

Overall Protection of Human Health and the Environment

This criterion assesses whether a remedial alternative provides adequate public health protection and describes how health risks posed by the site will be eliminated, reduced, or controlled through treatment, engineering controls, or institutional and regulatory controls.

Because the overall site risk based on an industrial scenario falls within the NCP-defined generally acceptable range, the NFA alternative provides some protection of human health. However, during SFAs, *volatile organic compounds* in the groundwater beneath Gull Park (AOPCs 1 and 4) were detected at concentrations above California Ocean Plan criteria. Additionally, cans, drums, and other debris exist below Gull Park and require removal.

Alternatives 2 and 3 provide a means to preserve anticipated industrial site use via deed restrictions. In addition, long-term groundwater monitoring, included as part of Alternatives 2 and 3, provides protection by monitoring the migration of groundwater contaminants. The potential for human exposure to contaminants is limited to workers drilling to install groundwater monitoring wells and to periodic groundwater sampling activities. Groundwater monitoring has little impact on surrounding ecosystems. Long-term groundwater monitoring is currently ongoing at IR Sites 1 and 2.

For Alternative 3, IAS with SVE, the potential for human exposure to contaminants is restricted to on-site drilling operations, work with the aboveground off-gas stream, and sampling activities. Although the potential for groundwater *mounding* exists, it can be easily monitored and corrected by reducing flowrates and changing operational configurations. IAS with SVE also has minimal ecosystem impacts. Application of SVE avoids volatile emissions to the atmosphere by directing sparged contaminants to the SVE wells where the captured air can be treated above ground.

IAS with SVE (Alternative 3) will reduce contaminant concentrations or reduce the potential for continued transport of contaminants in soils and groundwater. With proper design and operation, the use of IAS/SVE permanently removes and destroys contaminants. Groundwater will be monitored as part of Alternative 3 for two years during operation and for one additional year to verify effectiveness of the remedial action.

Compliance with ARARs

Compliance with ARARs addresses whether a remedial action alternative meets all related Federal and state environmental statutes or requirements. An alternative must comply with ARARs or be covered by a waiver to be acceptable.

The NFA alternative and Alternative 2 are not expected to comply with California Ocean Plan criteria for groundwater quality. Alternative 3, IAS with SVE, is an effective remedial technology and is expected to comply with ARARs.

PRIMARY BALANCING CRITERIA

Long-Term Effectiveness

This criterion addresses the ability of a remedial alternative to maintain reliable protection of human health and the environment over time, after the remedial action objectives have been accomplished.

The NFA alternative provides limited long-term effectiveness and permanence because there is no provision for ensuring industrial land use. Properly instituted deed restrictions (Alternatives 2 and 3) can effectively limit land use options. Groundwater monitoring (Alternatives 2 and 3) will detect changes in site groundwater quality and flow conditions, but requires repeated sampling and analysis of environmental media.

IAS with SVE (Alternative 3) will reduce contaminant concentrations or reduce the potential for continued transport of contaminants in soils and groundwater. With proper design and operation, the use of IAS/SVE permanently removes and destroys contaminants. Groundwater will be monitored as part of Alternative 3 for two years during operation and for one additional year to verify effectiveness of the remedial action.

Reduction of Toxicity, Mobility, or Volume of Contaminants

The evaluation of this criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants.

The NFA alternative is not a treatment technology and does not reduce the toxicity, mobility, or volume of contaminants at IR Sites 1 and 2. Likewise, neither deed restrictions nor long-term groundwater monitoring (Alternative 2) reduce the toxicity, mobility, or volume of contaminants at IR Sites 1 and 2.

Alternative 3, IAS with SVE, can reduce the toxicity, mobility, and volume of COPCs at AOPCs 1 and 4 by removing or destroying contaminants in the soil and groundwater.

Short-Term Effectiveness

The evaluation of short-term effectiveness addresses how well human health and the environment are protected from impacts during the construction and implementation phases of a remedial alternative.

Because the NFA alternative does not entail any action, potential short-term effects on workers and the public are minimal. Likewise, because deed restrictions and groundwater monitoring (Alternatives 2 and 3) do not require construction or installation of equipment on site, potential short-term effects on workers and the public are minimal.

IAS requires environmental drilling and construction of IAS (and SVE) wells. Environmental drilling will probably produce contaminated soil cuttings and liquids that could pose some risk to site workers. In addition, implementing IAS requires construction of pipe manifolds, equipment pads, and electrical connections for equipment. Finally, long-term operation of IAS requires ex situ vapor treatment. The treatment of collected vapors, especially VC, may present moderate risks to workers and surrounding populations. A reliable, effective vapor treatment system is needed in conjunction with IAS activities.

Implementability

Evaluation of implementability addresses the technical and administrative feasibility of implementing an alternative, including an evaluation of the availability of technologies, services, and materials required during implementation.

The NFA alternative is the easiest alternative to implement at IR Sites 1 and 2 because it does not require any further action. Deed restrictions, included as part of Alternatives 2 and 3, can be imposed by existing legal mechanisms. Long-term groundwater monitoring (Alternatives 2 and 3) employs standard available commercial technologies and is ongoing at IR Sites 1 and 2. Alternative 3 includes technologies and equipment that are readily available. Because of variable conditions within the groundwater zone at Gull Park, pilot-scale testing for IAS is needed to evaluate its overall effectiveness.

Cost

Evaluation of cost addresses the total cost of the remedial action, including capital and O&M costs. Costs are representative of net present worth value, as required by the Proposed Plan/Draft RAP guidance.

There are no additional costs associated with the NFA alternative. Deed restrictions costs are relatively small, and long-term groundwater monitoring costs are moderate, depending on the period of time necessary to evaluate contaminant movement. The costs as presented here and in the FS report assume that groundwater monitoring will continue for one more year at IR Sites 1 and 2.

Alternative 3, IAS with SVE, is not a low-cost treatment alternative and is more expensive than Alternatives 1 or 2. The initial capital cost for installing an IAS with SVE system in Gull Park assumes that some support services (for example, power supply and investigation-derived waste disposal) can be provided by existing Base infrastructure. Annual O&M costs are mainly for electrical power, monitoring, equipment rental, and vapor treatment. The cost estimate assumes that the IAS with SVE system will run for 2 years and will be followed up by one additional year of groundwater monitoring. Additional costs are associated with implementation of institutional controls and groundwater monitoring.

MODIFYING CRITERIA

State Acceptance

Evaluation of this criterion addresses the apparent

acceptability of the alternative to State of California regulatory agencies. The evaluation of state acceptance presented in the FS report is qualitative and will be fully addressed during the public comment period and preparation of a ROD/Final RAP.

Community Acceptance

Evaluation of this criterion addresses the apparent acceptability of the alternative to the community. The evaluation of community acceptance presented in the FS report is qualitative and will be fully addressed during the public comment period and preparation of a ROD/Final RAP.

SUMMARY OF PREFERRED ALTERNATIVE AT IR SITES 1 AND 2

Alternative 3, which includes IAS with SVE, institutional controls (deed restrictions), and long-term groundwater monitoring, offers the best balance of performance for IR Sites 1 and 2. As part of Alternative 3, debris and soil clinging to the debris also will be removed from IR Sites 1 and 2, AOPCs 1 and 4.

Based on the RI, including the HHRA, most of the area of IR Sites 1 and 2 contains no contaminants that exceed the U.S. EPA's target range of 10^{-4} to 10^{-6} . IAS with SVE will be applied to AOPCs 1 and 4, to the area at the east end of the mole where contaminants are present in groundwater. The following paragraphs briefly describe the rationale for selecting deed restrictions and long-term groundwater monitoring, and IAS with SVE.

Deed restrictions are recommended as a method to prevent changes in future land use that may increase exposure risks at IR Sites 1 and 2. Deed restrictions can be implemented using existing legal procedures and would ensure that land usage at the sites remains industrial. Examples of deed restrictions include provisions to prevent disturbance of monitoring systems; restrictions on land use to prevent residential development or well drilling; and requirements for managing soils or groundwater disturbed as a result of site operations.

The current quarterly groundwater monitoring is necessary to ensure that groundwater contaminants at concentrations in excess of California Ocean Plan criteria are not migrating into marine ecosystems. The groundwater monitoring at IR Sites 1 and 2 is expected to continue for two years during system operation and for one more year afterward to verify the effectiveness of groundwater remediation.

The groundwater treatment technology (IAS with SVE) will reduce and remove organic compounds from affected media at IR Sites 1 and 2, AOPCs 1 and 4. The DON also will remove debris and soil clinging to the debris from this area to eliminate existing and future sources of contamination. Based on information that is currently available, the DON expects that the preferred alternative will satisfy the statutory requirements in CERCLA section 121(b) that the selected alternative:

- Be protective of human health and the environment
- Comply with ARARs

- Be cost-effective
- Use permanent solutions and alternative treatment technologies to the maximum extent practicable, and
- Satisfy the statutory preference for treatment as a principal element, or justify not meeting the preference.

OPPORTUNITIES FOR PUBLIC INVOLVEMENT

COMMENT PERIOD AND PUBLIC MEETING:

The 30-day public comment period is June 10, 1999 through July 9, 1999. If requested by June 30, 1999, the Navy will extend the public comment period by a minimum of 30 additional days. Requests for extension of the comment period should be sent to Mr. Lee Saunders at the address provided below.

A public meeting will be held on
June 28, 1999 at 6:30 PM at
City of Long Beach Community Room
200 Pine Street, 4th Floor
Long Beach, California.

Please mail your written comments to Mr. Lee Saunders at the address below or bring them to the public meeting on June 28, 1999.

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GLOSSARY

- Administrative Record** A collection of all documents used to select and justify remedial alternatives and selected actions at LBNC. These documents are available for public review.
- Applicable or Relevant and Appropriate Requirements (ARARs)** The Federal and state laws and regulations that must be followed for the selected remedy.
- Area of Concern (AOC)** An area delineated within a CERCLA site where contamination is present at concentrations exceeding threshold criteria.
- Area of Potential Concern (AOPC)** An area delineated within a CERCLA site where the potential for contamination exists based on site history, physical characteristics, and compounds present in groundwater or soil samples collected during the RI.
- Aquifer** Rock or sediment in a formation that is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs.
- Background** Naturally occurring levels of a chemical in the environment. The term is typically used to describe ambient concentrations of trace metals (e.g., arsenic) in the environment that have not been influenced by humans.
- California Health and Safety Code** Code of regulations established by the State of California to protect the safety and health of workers and the public, and protects the environment.
- California Ocean Plan** Guidelines established by the State of California to protect ocean water and the marine ecosystem from pollutants.
- California Ocean Plan Criteria** Specific, numeric criteria set forth in the *California Ocean Plan* established by the State of California to protect ocean water and the marine ecosystem from pollutants.
- Chemical of Concern (COC)** A chemical compound or element present at concentrations that exceed regulatory or risk-based thresholds and would pose a threat to human health or the environment.
- Chemical of Potential Concern (COPC)** A chemical compound or element that was identified as present in groundwater or soil samples collected during the RI.
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)** Commonly referred to as Superfund, authorizes Federal action to respond to the release, or threat of release, into the environment of hazardous substances, pollutants, or contaminants that may present an imminent or substantial danger to public health or welfare or to the environment.
- Data Quality Objectives** Objectives that determine the number of sampling locations and types of samples needed, the methods used to identify and quantify COPCs and analytical detection limits. They are intended to specify the level of uncertainty in sample results and thereby the quality of the data.
- Draft Remedial Action Plan (Draft RAP)** The RAP is DTSC's remedy selection document for hazardous substance release sites addressed pursuant to California Health and Safety Code section 25356.1. The Draft RAP, which contains the proposed remedy, is circulated for a 30-day public review and comment period, during which time the public is encouraged to submit comments and participate in the remedy selection process. The State's Draft RAP is similar to the Proposed Plan.
- Excess Lifetime Cancer Risk (ELCR)** The chance of contracting cancer over a human's lifetime due to exposure to site chemicals. U.S. EPA has developed a risk management range of 10^{-4} (1 in 10,000) to 10^{-6} (1 in a million) as the target for managing risk.
- Feasibility Study (FS)** An engineering evaluation of technologies that may be used to clean up a site. The study looks at site conditions, potential technical problems, costs, and human and ecological impacts to determine how effective the technologies may be.
- Final Remedial Action Plan (Final RAP)** The RAP is DTSC's remedy selection document for hazardous substance release sites addressed pursuant to California Health and Safety Code section 25356.1. The Final RAP contains the final remedy selection decision. Once the Final RAP is signed, a notice is placed in a newspaper(s) of general circulation in the area affected by the Final RAP. The State's Final RAP is similar to the Record of Decision (ROD).
- Groundwater** Water beneath the ground surface that fills spaces between soil particles. Groundwater at LBNC is not potable due to high naturally occurring mineral content.
- Hazard Index** The ratio of actual or potential level of exposure to an acceptable level of exposure for a given chemical. The index is used to evaluate non-cancer health effects. U.S. EPA recognizes a hazard index of less than 1 to represent acceptable non-cancer risk.
- Human Health Risk Assessment (HHRA)** A mathematical process that quantifies the risk to human health from exposure to chemicals at a site.
- Industrial Exposure Scenario** A model for potential human exposure to contaminants based on the planned industrial uses of the site.
- Information Repository** The physical location where a collection of site information is maintained. It contains copies of documents available for public review.
- In Situ Air Sparging (IAS)** A treatment technology in which pressurized air is injected into a contaminated aquifer, for remediation of contaminated groundwater.

Installation Restoration (IR) Sites Areas designated under the Navy's program to identify, investigate, assess, characterize, clean up, or control past releases of hazardous substances.

Institutional Controls A legal or institutional mechanism that limits access to or use of property, or warns of a hazard (i.e., land use restrictions imposed by the property owner contained in a property deed).

Marine Ecosystem The plants, animals, other organisms, and habitat present in the ocean waters, intertidal area, and sediments surrounding the mole and along the LBNC shore line.

Mole The breakwater that includes IR Sites 1, 2, 3, and 4 at LBNC and that extends out into the Pacific Ocean to form Long Beach Harbor West Basin.

Mounding Temporary increase in water table elevation observed within groundwater monitoring wells often resulting from IAS and SVE activities.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) A regulation issued by the U.S. EPA to implement the requirements of CERCLA.

National Priorities List (NPL) A list compiled by U.S. EPA pursuant to CERCLA section 105, of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response.

No Further Action (NFA) The conclusion that no additional site environmental activities, beyond the RI/FS, are necessary. Used as a baseline for comparison with site alternatives identified in the FS.

Operation and Maintenance (O&M) Forecast activities and their associated costs necessary to operate and maintain a site activity or technology. For example, groundwater monitoring O&M would include groundwater sample collection, laboratory analysis, report preparation, and inspection/maintenance of the wells.

Organic Compounds Chemical compounds that contain the element carbon.

Plume A zone within the groundwater system where non-naturally occurring chemicals are present or where naturally occurring chemicals are present at concentrations above *background*.

Present Worth Value Equivalent dollars now of future expenditures. The present worth value is always less than the future worth value in terms of dollars.

Proposed Plan A plan that summarizes information from a RI/FS report. A proposed plan includes a summary of the environmental conditions at a site, as determined by the RI; describes the remedial alternatives; provides a summary explanation of any proposed waivers to the ARARs in CERCLA section 121(d)(4); and provides a brief analysis that supports the preferred alternative, discussed in terms of nine evaluation criteria.

Record of Decision (ROD) A report that documents how a site will be cleaned up and why the cleanup method was selected.

Regulatory Threshold Level Criteria set by Federal and state regulatory agencies to determine allowable concentrations of contaminants in soils and groundwater.

Remedial Action The final measure taken as a permanent remedy. It may take an extended period of time and may allow a specified level of contamination to remain on site.

Remedial Investigation (RI) Field study that includes collecting soil and groundwater samples to evaluate what type of and how much contamination is present at a site.

Remediate/Remediation Any active or passive environmental activity that results in the reduction of toxicity, mobility, or volume of contaminants at a site.

Removal Action A CERCLA action that often is the first response to a release or threatened release. It may be either an interim measure or final solution. Removal actions may occur at any time in the CERCLA process.

Responsiveness Summary A document that contains responses to all oral and written public comments received during the public comment period.

Reuse Plan A written plan developed by the local redevelopment authority, which includes members from the community. The plan describes the intended use(s) to which the site will be put.

Soil Vapor Extraction (SVE) A treatment technology in which volatile organic compounds are removed from soil in situ by induced airflow.

Vadose Zone The soil zone between the water table and ground surface.

Volatile Organic Compound A chemical compound that contains the element carbon and that evaporates readily into air at room temperature.

ACRONYMS

AOC	area of concern
AOPC	area of potential concern
ARAR	applicable or relevant and appropriate requirements
Cal-EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
DCE	1,1-dichloroethene
DON	Department of the Navy
DTSC	Department of Toxic Substances Control
ELCR	excess lifetime cancer risk
FS	feasibility study
HHRA	human health risk assessment
IAS	in situ air sparging
IR	installation restoration
LBNC	Long Beach Naval Complex
LRA	Local Redevelopment Authority
NAVSTA	naval station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	no further action
NPL	National Priorities List
O&M	operation and maintenance
RAP	remedial action plan
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RWQCB	Regional Water Quality Control Board
SFA	supplemental field activities
SVE	soil vapor extraction
TCE	trichloroethene
U.S. EPA	U.S. Environmental Protection Agency
VC	vinyl chloride